

AMENDMENTS TO THE CLAIMS

1-31. (Canceled)

32. (Currently amended) A method of perforating a membrane comprising:

selecting a site on a membrane;

bringing a membrane-denaturing substance into contact with or close proximity to at least a said site of said membrane, said membrane being a cell membrane, intracellular membrane, or artificial lipid membrane;

providing a stimulus to said substance so as to denature [[a]] the selected site of said membrane; and

perforating said denatured selected site of said membrane with a membrane-destroying member where the membrane recovers to the state prior to perforation;

wherein said substance is a photosensitizer or photocatalyst and said stimulus is light, and wherein said light is carried through said membrane-destroying member from a light source.

33. (Canceled)

34. (Previously presented) The method according to claim 32, wherein said light includes ultraviolet light.

35-36. (Canceled)

37. (Previously presented) The method according to claim 32, wherein said membrane-destroying member constitutes a supporting member for supporting the membrane-denaturing substance and a stimulus carrying member for carrying the stimulus.

38. (Previously presented) The method according to claim 32, wherein said membrane-destroying member is a capillary.

39. (Previously presented) The method according to claim 37, wherein said membrane-destroying member is a capillary.

40. (Previously presented) The method according to claim 38, wherein said light transmits through the side wall of said capillary as a light guide, and said light is applied to said membrane-denaturing substance from the tip of said capillary.

41. (Previously presented) The method according to claim 39, wherein said light transmits through the side wall of said capillary as a light guide, and said light is applied to said membrane-denaturing substance from the tip of said capillary.

42. (Previously presented) The method according to claim 32, wherein said membrane-destroying member is an intracellular sensor.

43. (Previously presented) The method according to claim 37, wherein said membrane-destroying member is an intracellular sensor.

44. (Currently amended) A method of perforating a membrane comprising:

selecting a site on a membrane;

bringing a membrane-denaturing substance into contact with or close proximity to ~~at least a~~ said site of said membrane, said membrane being a cell membrane, intracellular membrane, or artificial lipid membrane;

said bringing done by a supporting member for supporting said substance; and

providing said stimulus to said substance so as to denature ~~[[a]]~~ the selected site of said membrane and perforate said denatured selected site of said membrane where the membrane recovers to the state prior to perforation;

wherein said substance is a photosensitizer or photocatalyst and said stimulus is light, and wherein said light is carried through said supporting member from a light source.

45. (Canceled)

46. (Previously presented) The method according to claim 44, wherein said light includes ultraviolet light.

47-48. (Canceled)

49. (Previously presented) The method according to claim 44, wherein said supporting member constitutes a membrane-destroying member for perforating the membrane and a stimulus carrying member for carrying the stimulus.

50. (Previously presented) The method according to claim 44, wherein said supporting member is a capillary.

51. (Previously presented) The method according to claim 49, wherein said supporting member is a capillary.

52. (Previously presented) The method according to claim 50, wherein said light transmits through the side wall of said capillary as a light guide, and said light is applied to said membrane-denaturing substance from the tip of said capillary.

53. (Previously presented) The method according to claim 51, wherein said light transmits through the side wall of said capillary as a light guide, and said light is applied to said membrane-denaturing substance from the tip of said capillary.

54. (Previously presented) The method according to claim 44, wherein said supporting member is an intracellular sensor.

55. (Previously presented) The method according to claim 49, wherein said supporting member is an intracellular sensor.

56. (Currently amended) A method of perforating a membrane comprising:

selecting a site on a membrane;

bringing a membrane-denaturing substance into contact with or close proximity to at least a said site of said membrane, said membrane being a cell membrane, intracellular membrane, or artificial lipid membrane; and

providing ~~[[said]]~~ a stimulus to said substance so as to denature ~~[[a]]~~ the selected site of said membrane and perforate said denatured selected site of said membrane where the membrane recovers to the state prior to perforation;

wherein said substance is a photosensitizer or photocatalyst and said stimulus is light, and wherein said light is carried through a stimulus-carrying member from a light source, and said stimulus-carrying member locally introduces said stimulus to said selected site of said membrane.

57. (Canceled)

58. (Previously presented) The method according to claim 56, wherein said light includes ultraviolet light.

59-60. (Canceled)

61. (Previously presented) The method according to claim 56, wherein said stimulus carrying member constitutes a supporting member for supporting the membrane-denaturing substance and a membrane-destroying member for perforating the membrane.

62. (Previously presented) The method according to claim 56, wherein said stimulus-carrying member is a capillary.

63. (Previously presented) The method according to claim 61, wherein said stimulus-carrying member is a capillary.

64. (Previously presented) The method according to claim 62, wherein said light transmits through the side wall of said capillary as a light guide, and said light is applied to said membrane-denaturing substance from the tip of said capillary.

65. (Previously presented) The method according to claim 63, wherein said light transmits through the side wall of said capillary as a light guide, and said light is applied to said membrane-denaturing substance from the tip of said capillary.

66. (Previously presented) The method according to claim 56, wherein at least one optical fiber extends along the length of said capillary, wherein a distal end of said fiber extends to the tip of said capillary so as to apply said light to said substance from the end of said fiber.

67. (Previously presented) The method according to claim 56, wherein said stimulus-carrying member is an intracellular sensor.

68. (Previously presented) The method according to claim 61, wherein said stimulus-carrying member is an intracellular sensor.

69. (Currently amended) A microinjection method comprising:
perforating a membrane using the method as claimed in claim 32; and
injecting a desired substance inside the membrane;
wherein said desired substance ~~to be injected inside said membrane~~ comprises a photosensitizer or photocatalyst as a membrane-denaturing substance that induces a membrane-denaturing reaction by light as a stimulus; and an additional substance.

70-72. (Canceled)

73. (Previously presented) The microinjection method according to claim 69, the method comprising filling a capillary with said substance to be injected, penetrating the tip of

said capillary into the membrane, and injecting said substance into the membrane through said capillary.

74. (Previously presented) A microinjection method comprising:
perforating a membrane using the method as claimed in claim 44; and
injecting a desired substance inside the membrane;

wherein said substance to be injected into said membrane comprises a photosensitizer or photocatalyst as a membrane-denaturing substance that induces a membrane-denaturing reaction by light as a stimulus; and an additional substance.

75-77. (Canceled)

78. (Previously presented) The microinjection method according to claim 74, wherein said supporting member is a capillary, said method comprising filling the capillary with the substance to be injected, penetrating the tip of the capillary into the membrane, and injecting said substance into the membrane through the capillary.

79. (Previously presented) A microinjection method comprising:
perforating a membrane using the method as claimed in claim 56; and
injecting a desired substance inside the membrane;

wherein said substance to be injected into said membrane comprises a photosensitizer or photocatalyst as a membrane-denaturing substance that induces a membrane-denaturing reaction by light as a stimulus; and an additional substance.

80-82. (Canceled)

83. (Previously presented) The microinjection method according to claim 79, the method comprising filling a capillary with the substance to be injected, penetrating the tip of said

capillary into the membrane, and said substance being injected into the membrane through said capillary.

84. (Withdrawn) An apparatus for perforating a membrane comprising:

a membrane-destroying member for supporting a membrane-denaturing substance that induces a membrane-denaturing reaction by a stimulus; and

a stimulus supply source; and

wherein said stimulus supplied by said supply source is transmitted to said membrane-denaturing substance through said membrane-destroying member, said substance is brought in contact with or close proximity to at least a site of said membrane by said membrane-destroying member, and said stimulus is given to said membrane-denaturing substance so as to perforate said membrane by said membrane-destroying member.

85. (Withdrawn) The apparatus according to claim 53, said stimulus is selected from the group comprising electromagnetic waves including light, particle rays including radiation, heat, cooling, electricity, magnetism, oscillations including ultrasonic waves, physical contact, chemical substances, living beings including cells, viruses, and any combinations thereof.

86. (Withdrawn) The apparatus according to claim 54, wherein said stimulus is light and said substance is a photosensitizer.

87. (Withdrawn) The apparatus according to claim 54, wherein said stimulus is light and said substance is a photocatalyst.

88. (Withdrawn) The apparatus according to claim 54, wherein said stimulus supply is a light source.

89. (Withdrawn) The apparatus according to claim 54, wherein said stimulus supply is an electric power source or heat supply, and wherein said membrane-destroying member

comprises a light emitting element, said power or heat is converted into the light stimulus by said light emitting element.

90. (Withdrawn) The apparatus according to claim 53, wherein said membrane-destroying member is a capillary.

91-92. (Canceled)

93. (Withdrawn) A microinjection apparatus comprising the membrane perforating apparatus as claimed in claim 53.

94. (Withdrawn) The microinjection apparatus according to claim 62, wherein said membrane-destroying member is a capillary, and filling the capillary with the substance to be injected, penetrating the tip of the capillary into the membrane, and said substance being injected into the membrane through the capillary.

95. (Withdrawn) The microinjection apparatus according to claim 62, wherein said substance to be injected into said membrane contains a membrane denaturing substance that induces a membrane-denaturing reaction by a stimulus.

96. (Withdrawn) The microinjection apparatus according to claim 62, wherein said stimulus is light and said membrane-denaturing substance is a photosensitizer.

97. (Withdrawn) The microinjection apparatus according to claim 62, wherein said substance to be injected into said membrane is selected from the group comprising, nucleic acids, proteins, lipids, membrane structures, micro machines, and magnetic particles.

98. (New) A method of perforating a membrane comprising:

bringing a membrane-denaturing substance into contact with or close proximity to at least a site of said membrane, said membrane being a cell membrane, intracellular membrane, or artificial lipid membrane;

providing a stimulus to said substance so as to denature a selected site of said membrane;
and

perforating said denatured selected site of said membrane with a membrane-destroying member where the membrane recovers to the state prior to perforation;

wherein said substance is a photosensitizer or photocatalyst and said stimulus is light, wherein said light is carried through said membrane-destroying member from a light source, and wherein said membrane-destroying member is a capillary; and

wherein said light transmits through the side wall of said capillary as a light guide, and said light is applied to said membrane-denaturing substance from the tip of said capillary.

99. (New) A method of perforating a membrane comprising:

bringing a membrane-denaturing substance into contact with or close proximity to at least a site of said membrane, said membrane being a cell membrane, intracellular membrane, or artificial lipid membrane;

providing a stimulus to said substance so as to denature a selected site of said membrane;
and

perforating said denatured selected site of said membrane with a membrane-destroying member where the membrane recovers to the state prior to perforation;

wherein said substance is a photosensitizer or photocatalyst and said stimulus is light, and wherein said light is carried through said membrane-destroying member from a light source;

wherein said membrane-destroying member constitutes a supporting member for supporting the membrane-denaturing substance and a stimulus carrying member for carrying the stimulus, and wherein said membrane-destroying member is a capillary; and

wherein said light transmits through the side wall of said capillary as a light guide, and said light is applied to said membrane-denaturing substance from the tip of said capillary.

100. (New) A method of perforating a membrane comprising:

bringing a membrane-denaturing substance into contact with or close proximity to at least a site of said membrane, said membrane being a cell membrane, intracellular membrane, or artificial lipid membrane;

providing a stimulus to said substance so as to denature a selected site of said membrane;

perforating said denatured selected site of said membrane with a membrane-destroying member where the membrane recovers to the state prior to perforation;

wherein said substance is a photosensitizer or photocatalyst and said stimulus is light, wherein said light is carried through said membrane-destroying member from a light source, and wherein said membrane-destroying member is an intracellular sensor.

101. (New) A method of perforating a membrane comprising:

bringing a membrane-denaturing substance into contact with or close proximity to at least a site of said membrane, said membrane being a cell membrane, intracellular membrane, or artificial lipid membrane;

providing a stimulus to said substance so as to denature a selected site of said membrane;

perforating said denatured selected site of said membrane with a membrane-destroying member where the membrane recovers to the state prior to perforation;

wherein said substance is a photosensitizer or photocatalyst and said stimulus is light, and wherein said light is carried through said membrane-destroying member from a light source;

wherein said membrane-destroying member constitutes a supporting member for supporting the membrane-denaturing substance and a stimulus carrying member for carrying the stimulus, and wherein said membrane-destroying member is an intracellular sensor.

102. (New) A method of perforating a membrane comprising:

bringing a membrane-denaturing substance into contact with or close proximity to at least a site of said membrane, said membrane being a cell membrane, intracellular membrane, or artificial lipid membrane;

said bringing done by a supporting member for supporting said substance; and

providing said stimulus to said substance so as to denature a selected site of said membrane and perforate said denatured selected site of said membrane where the membrane recovers to the state prior to perforation;

wherein said substance is a photosensitizer or photocatalyst and said stimulus is light, and wherein said light is carried through said supporting member from a light source, and wherein said supporting member is a capillary; and

wherein said light transmits through the side wall of said capillary as a light guide, and said light is applied to said membrane-denaturing substance from the tip of said capillary.

103. (New) A method of perforating a membrane comprising:

bringing a membrane-denaturing substance into contact with or close proximity to at least a site of said membrane, said membrane being a cell membrane, intracellular membrane, or artificial lipid membrane;

said bringing done by a supporting member for supporting said substance; and

providing said stimulus to said substance so as to denature a selected site of said membrane and perforate said denatured selected site of said membrane where the membrane recovers to the state prior to perforation;

wherein said substance is a photosensitizer or photocatalyst and said stimulus is light, and wherein said light is carried through said supporting member from a light source;

wherein said supporting member constitutes a membrane-destroying member for perforating the membrane and a stimulus carrying member for carrying the stimulus, and wherein said supporting member is a capillary; and

wherein said light transmits through the side wall of said capillary as a light guide, and said light is applied to said membrane-denaturing substance from the tip of said capillary.

104. (New) A method of perforating a membrane comprising:

bringing a membrane-denaturing substance into contact with or close proximity to at least a site of said membrane, said membrane being a cell membrane, intracellular membrane, or artificial lipid membrane;

said bringing done by a supporting member for supporting said substance; and

providing said stimulus to said substance so as to denature a selected site of said membrane and perforate said denatured selected site of said membrane where the membrane recovers to the state prior to perforation;

wherein said substance is a photosensitizer or photocatalyst and said stimulus is light, and wherein said light is carried through said supporting member from a light source, and wherein said supporting member is an intracellular sensor.

105. (New) A method of perforating a membrane comprising:

bringing a membrane-denaturing substance into contact with or close proximity to at least a site of said membrane, said membrane being a cell membrane, intracellular membrane, or artificial lipid membrane;

said bringing done by a supporting member for supporting said substance; and

providing said stimulus to said substance so as to denature a selected site of said membrane and perforate said denatured selected site of said membrane where the membrane recovers to the state prior to perforation;

wherein said substance is a photosensitizer or photocatalyst and said stimulus is light, and wherein said light is carried through said supporting member from a light source;

wherein said supporting member constitutes a membrane-destroying member for perforating the membrane and a stimulus carrying member for carrying the stimulus, and wherein said supporting member is an intracellular sensor.

106. A microinjection method comprising:

perforating a membrane by bringing a membrane-denaturing substance into contact with or close proximity to at least a site of said membrane, said membrane being a cell membrane, intracellular membrane, or artificial lipid membrane, said bringing done by a supporting member for supporting said substance, and providing said stimulus to said substance so as to denature a selected site of said membrane and perforate said denatured selected site of said membrane where the membrane recovers to the state prior to perforation, wherein said substance is a photosensitizer or photocatalyst and said stimulus is light, and wherein said light is carried through said supporting member from a light source;

injecting a desired substance inside the membrane;

wherein said substance to be injected into said membrane comprises a photosensitizer or photocatalyst as a membrane-denaturing substance that induces a membrane-denaturing reaction by light as a stimulus; and an additional substance; and

wherein said supporting member is a capillary, said method comprising filling the capillary with the substance to be injected, penetrating the tip of the capillary into the membrane, and injecting said substance into the membrane through the capillary.